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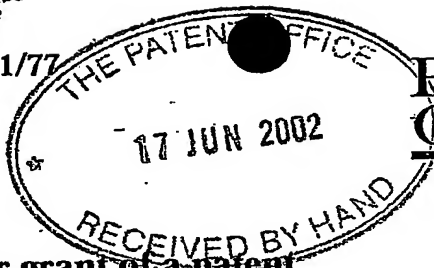
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Dated 4 July 2003



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18JUN02 0726488-4 D02870
P01/7700 0.00-0213869.1

The Patent Office

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Request for grant of a patent

(See the notes on the back of this form. You can also get an explanatory leaflet from the Patent Office to help you fill in this form)

1. Your reference

REP07147GB

2. Patent application number

(The Patent Office will fill in this part)

17 JUN 2002

0213869.1

3. Full name, address and postcode of the or of each applicant (underline all surnames)

Arakis Ltd.
Chesterford Research Park
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Saffron Walden
Essex CB10 1XL

08306128001

Patents ADP number (if you know it)

If the applicant is a corporate body, give the country/state of its incorporation

United Kingdom

4. Title of the invention

THE TREATMENT OF PAIN

5. Name of your agent (if you have one)

Gill Jennings & Every

"Address for service" in the United Kingdom to which all correspondence should be sent (including the postcode)

Broadgate House
7 Eldon Street
London
EC2M 7LH

Patents ADP number (if you know it)

745002

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and (if you know it) the or each application number

Country

Priority application number
(if you know it)

Date of filing
(day / month / year)

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application

Date of filing
(day / month / year)

8. Is a statement of inventorship and of right to grant of a patent required in support of this request? (Answer 'Yes' if

YES

- a) any applicant named in part 3 is not an inventor, or
 - b) there is an inventor who is not named as an applicant, or
 - c) any named applicant is a corporate body.
- See note (d))

Patents Form 1/77

Enter the number of sheets for any of the following items you are filing with this form.
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Continuation sheets of this form

Description

3

Claim(s)

1

Abstract

Drawing(s)

10. If you are also filing any of the following, state how many against each item.

Priority documents

Translations of priority documents

Statement of inventorship and right to grant of a patent (*Patents Form 7/77*)

Request for preliminary examination and search (*Patents Form 9/77*)

Request for substantive examination (*Patents Form 10/77*)

Any other documents
(please specify)

NO

11. For the applicant
Gill Jennings & Every

I/We request the grant of a patent on the basis of this application.

Signature

Date

17 June 2002

12. Name and daytime telephone number of person to contact in the United Kingdom

R E Perry

020 7377 1377

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THE TREATMENT OF PAIN

Field of the Invention

This invention relates to the treatment of pain.

Background of the Invention

5 Nefopam [(±)-3,4,5,6-tetrahydro-5-methyl-1-phenyl-1H-2,5-benzoxazocine hydrochloride] is a centrally acting non-narcotic analgesic not structurally related to other analgesics. Nefopam has been shown to induce antinociception in animal models of pain and in humans (reviewed in Heel *et al.*, 1980). However, nefopam is not active in the mouse tail-flick test, or the hot plate test and the
10 Randall-Selitto pressure test in rats (Conway and Mitchell, 1977), suggesting that its analgesic mechanism is not opiate-like or anti-inflammatory in nature. Nefopam's antinociception is not blocked by naloxone, further suggesting that its analgesic action is not through opiate receptors. Although the precise mechanism of antinociception is not known it is thought to involve inhibition of
15 synaptosomal uptake of dopamine, norepinephrine and serotonin (VonVoigtlander *et al.*, 1983; Rosland and Hole, 1990; Mather *et al.*, 2001).

In vitro and *in vivo* studies with nefopam enantiomers have shown that (+)-nefopam has more potent analgesic and dopamine, norepinephrine and serotonin-uptake inhibitory properties than (-)-nefopam, with the order of potency
20 given as (+)-nefopam > (±)-nefopam > (-)-nefopam (Fasmer *et al.*, 1987; Rosland and Hole, 1990; Mather *et al.*, 2001). Mather *et al.* (2001) conclude that "...there is currently no compelling rationale to justify administering or monitoring individual enantiomers [of nefopam]".

Nefopam has also been shown to be opiate-sparing when given with
25 morphine in trials of patient-controlled analgesia (Mimoz *et al.*, 2001).

Conventional release preparations of nefopam have been commercially available for many years for use in moderate to severe pain yet the short elimination half-life of nefopam (four hours) means that it is difficult to maintain analgesic efficacy over the normal dosing period (three times daily). Dose
30 escalation of nefopam brings about an increase in the frequency of adverse drug reactions associated with the analgesic, and adverse effects on pulse and blood pressure have been observed following parenteral delivery of therapeutic doses

of nefopam (Heel *et al.*, 1980). Chronotropic and ionotropic effects on the heart are not present when nefopam is administered orally (Bhatt *et al.*, 1981).

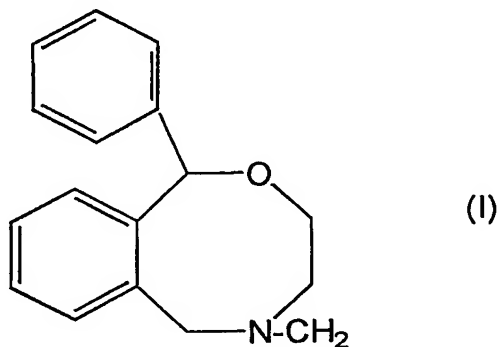
Despite nefopam's long-standing use, controlled release preparations for oral administration containing nefopam as active ingredient have not previously been described.

Summary of the Invention

According to the present invention, emesis or pain such as acute, chronic or neuropathic pain (including, but not limited to, pain associated with cancer, surgery, arthritis, dental surgery, painful neuropathies, trauma, musculo-skeletal injury or disease, visceral diseases) and migraine headache in mammals, can be treated by the use of nefopam. This can be done using nefopam or another analgesic drug in (a) an immediate release form in association with nefopam in (b) a controlled release form.

Description of Preferred Embodiments

Nefopam has formula I



The compound expressed by the formula includes (+) and (-) enantiomers and the (+) isomer (nefopam) is preferably used.

Preferably, the immediate release analgesic drug is an opioid analgesic. An alternative preference is that the immediate release analgesic drug is at least one of acetaminophen, a non-steroidal anti-inflammatory drug, a narcotic analgesic, a local anaesthetic, an NMDA antagonist, a neuroleptic agent, an anti-convulsant, an anti-spasmodic, an anti-depressant or a muscle relaxant.

Preferably, the component (b) is co-administered with (c) an analgesic

amount of an opiate, the total amount of (b) and (c) administered being a more effective analgesic. Alternatively, the component (b) is co-administered with (c) an analgesic amount of at least one nefopam analgesia-enhancer selected from acetaminophen, a non-steroidal anti-inflammatory drug, a narcotic analgesic, a local anaesthetic, an NMDA antagonist, a neuroleptic agent, an anti-convulsant, an anti-spasmodic, an anti-depressant and a muscle relaxant, the total amount of (b) and (c) administered being a more effective analgesic.

Another preference is that component (b) is co-administered with (c) a nefopam analgesia-enhancing, but essentially sub-analgesic, amount of an opiate analgesic, the total amount of (b) and (c) administered being an effective analgesic. Another alternative preference is that component (b) is co-administered with (c) a nefopam analgesia-enhancing, but essentially sub-analgesic, amount of at least one nefopam analgesia-enhancer selected from acetaminophen, a non-steroidal anti-inflammatory drug, a narcotic analgesic, a local anaesthetic, an NMDA antagonist, a neuroleptic agent, an anti-convulsant, an anti-spasmodic, an anti-depressant, a muscle relaxant, the total amount of (b) and (c) administered being an effective analgesic.

Another aspect of the invention is where nefopam is used to treat emesis, including, but not limited to, acute, delayed, post-operative, last-phase, and anticipatory emesis, for example, induced by chemotherapy, radiation, toxins, pregnancy, vestibular disorder, motion, post-operative sickness, surgery, gastrointestinal obstruction, reduced gastrointestinal motility, visceral pain, migraine, opioid analgesics and variations.

Any suitable route of administration can be used. For example, any of oral, topical, ocular, rectal, vaginal, inhalation and intranasal delivery routes may be suitable.

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Any suitable route of administration can be used. For example, any of
25 oral, topical, ocular, rectal, vaginal, inhalation and intranasal delivery routes may be suitable.

CLAIMS

1. Use of nefopam or an enantiomer thereof for the manufacture of a medicament for use in the treatment of pain.
 2. Use of nefopam or an enantiomer thereof for the manufacture of a medicament for use in the treatment of emesis.
- 5